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(54) Title: FOOTWEAR ARTICLE

(57) Abstract: A footwear article comprising a generally elongate sole for engagement with and support of the foot of a person, said sole having an upper surface, a lower surface, a first portion being for interaction with at least the heel region of the foot of the person and a second portion for interaction with at least the metatarsal region of the foot of the person; and a foot engagement means for securing the footwear article to the foot of a person. The footwear article being characterised in that a first portion of the sole includes a first material having a first material property and the a second portion of the sole includes a second material having a second material property; and said first portion and said second portion extend at least to the upper surface of the sole and first material property provides for dampening of load imparted to the foot of the person upon contact with a surface.

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PATENT REQUEST: INNOVATION PATENT

I, being the person identified below as the Applicant, am entitled to the grant of the patent for an invention described in the ***accompanying*** innovation complete specification.

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BASIC APPLICATION DETAILS

We are entitled to claim priority from the application listed below:

IB application no. PCT/IB2007/003419 filed 9 November 2007

Dated this 10th day of June 2009

DAVID FU

BY: FRANK PAPAMICHALAKIS
PAPPAS IP
Patent Attorneys for the Applicant

ref: P23039AU00

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FOOTWEAR ARTICLE

FIELD OF THE INVENTION

The present invention relates to the field of footwear articles, in particular to footwear of composite form

BACKGROUND OF THE INVENTION

It is well known in the art that shock loadings and forces applied to the underside of the foot of a person via the sole of footwear article have long term effects on the integrity of joints of a person, whilst also at times causing pain and discomfort, in particular when wearing footwear for extended periods of time.

Furthermore, it is well known that the majority of loading on impact to the foot of a person is imparted to the underside of the heel portion of the foot of a person in use.

Footwear articles of the prior art include various manners in which to increase comfort and conformity to the foot of user, including shock absorptive inserts, various types of foam rubber and air cushioning devices Such footwear articles typically require increased manufacturing costs and tooling, thus increasing complexity of production.

The present invention is provides a footwear article which overcomes or at least substantially ameliorates at least some of the deficiencies as exhibited by those of the prior art.

SUMMARY OF THE INVENTION

In a first aspect, the present invention provides a footwear article comprising:

a generally elongate sole for engagement with and support of the foot of a person, said sole having an upper surface, a lower surface, a first portion being for interaction with at least the heel region of the foot of the person and a second portion for interaction with at least the metatarsal region of the foot of the person; and

a foot engagement means for securing the footwear article to the foot of a person.

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characterised in that a first portion of the sole includes a first material having a first material property and the a second portion of the sole includes a second material having a second material property,

said first portion and said second portion extend at least to the upper surface of the sole and first material property provides for dampening of load imparted to the foot of the person upon contact with a surface.

Preferably the first portion further provides for interaction with and at least partial support of the plantar arch of the user, wherein the first portion extends substantially laterally across the sole.

Preferably the first material is a polyurethane gel and the second material is an expanded poly vinyl acetate material.

Preferably the sole is formed as a unitary construct by co-molding the first portion and the second portion together.

Preferably the article is provided in the form of a "flip-flop" type footwear article.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the present invention will be explained in further detail below by way of examples and with reference to the accompanying drawings, in which -

Figure 1a is a plan view of an exemplary embodiment of a footwear article according to the present invention;

Figure 1b is an underside view of the embodiment of the invention as depicted in Figure 1 a;

Figure 1c is a side view of the embodiment of the invention as depicted in Figures 1a and 1 b;

Figure 2a depicts an inside view of a schematic representation of the present invention;

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Figure 2b is an underside view of the schematic representation depicted in Figure 2a;

Figure 2c is an outside view of the schematic representation of the present invention depicted in Figures 2a and 2b;

Figure 2d is a section view through line D-D of Figure 2b;

Figure 2e is a plan view of the schematic representation depicted in Figures 2a to 2d;

Figure 2f is a section view through line A-A of Figure 2b;

Figure 2g is a section view through line B-B of Figure 2b;

Figure 2h is a section view through line C-C of Figure 2b;

Figure 3a is a plan view of a first schematic representation of an embodiment of the present invention;

Figure 3b is a plan view of a second schematic representation of an embodiment of the present invention;

Figure 3c is a plan view of a third schematic representation of an embodiment of the present invention;

Figure 3d is a plan view of a fourth schematic representation of an embodiment of the present invention;

Figure 4a is a plan view of a first schematic representation of a further embodiment of the present invention;

Figure 4b is a plan view of a second schematic representation of a further embodiment of the present invention;

Figure 4c is a plan view of a third schematic representation of a further embodiment of the present invention;

Figure 4d is a plan view of a fourth schematic representation of a further embodiment of the present invention;

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Figure 5a depicts another embodiment of a footwear article according to the present invention;

Figure 5b depicts a further embodiment of a footwear article according to the present invention;

Figure 6 depicts yet another embodiment of a footwear article according to the present invention;

Figure 7a depicts yet a further embodiment of a footwear article according to the present invention;

Figure 7b depicts the embodiment of the footwear article of Figure 7a in a non-flexed state, and

Figure 7c depicts the embodiment of the footwear article of Figure 7a in a flexed state.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Figures 1a to 1c and Figures 2a to 2h, an exemplary embodiment of a footwear article 100 according to the present invention is shown In the present embodiment, the footwear article 100 is provided in the form of a "flip-flop" type article, however other articles or other or alternate embodiments are also applicable to the invention, such as a sandal, slip-on type shoes or the like.

The article 100 is provided as a generally elongate sole 10 which, in the present invention, is provided as two portions, a first portion 16 and a second portion 18, although those skilled in the art will appreciate that the article 100 may be provided as further portions without departing from the invention.

A foot engagement means 20 is provided which is provided so as to cooperatively secure the article 100 to the foot of a person Although depicted as a typical "flip flop" engagement device, those skilled in the art shall appreciate that other engagement devices such as straps, buckles, cross-overs or the like are equally applicable to the invention. Co-operatively with the sole 10, the engagement means 20 secures the article 100 to the foot of a person.

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The engagement means 20 is affixed to the sole 10 of the article via apertures extending through the sole 10, the engagement means 20 having formations for abutting against and within recesses within the underside 14 of the sole 10. Again, those skilled in the art will understand that various engagement means may secured to the sole 10 in other manners where applicable.

The first portion 16 is positioned and formed from a material suitable for providing cushioning or dampening to the heel of a person when standing or during walking. The second portion 18 provides for support of the front portion or metatarsal portion of the foot of a person.

The sole 10 is provided with a concave upper surface 12 which is suitably contoured so as to provide for comfort of fit to the foot of a user when wearing the article 100. A peripheral lip 13 is provided which extends around the periphery of the sole 10 again providing for comfort to a user and for foot conformity.

In the present embodiment, the first portion 16 further extends as a medical portion 19 to provide arch support to the foot of a person Those skilled in the art will appreciate that other geometries and positioning of the first portion 16 may be provided in other or alternate embodiments so as to provide cushioning to the underside of the foot of a person, without departing from the scope of the invention.

The first portion 16 of the sole 10 is formed from a gel-type polymeric material, in the present embodiment a polyurethane gel material, the visco-elastic properties of which provide for cushioning and shock absorption to the heel portion of a user. The second portion 18 of the sole 10 is formed from a further polymeric material, in the present embodiment expanded polyurethane, which is integrally formed with the first portion 10. The second portion of the present embodiment forms the majority of the sole, the flexural properties in conjunction with suitable sizing provides for significant flexing of the sole when walking and again increases comfort to a use.

In the present embodiment of the article 100, the first portion 16 and the second portion 18 are integrally formed by a co-molding process so as to provide continuity between the portions 16 and 18. A co-molding process, as will readily

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be understood by those skilled in the art, is whereby the portions are molded together and are generally formed with a common mold.

By being formed as a co-molded sole 10, the present invention provides for continuity of the sole 10 to be formed as a unitary construct, allowing for ease of form and providing for continuity of the upper surface 12 of the sole, thus allowing for direct contact of the underside of the foot of a user and also provides for ease of formation and manufacturing. Further, by providing a unitary construct such that the sole 10 is substantially formed in total by the first portion 16 and the second portion 18, ease and simplicity of formation and manufacture is achieved.

In other or alternate embodiments, the sole 10 may be formed by adhering the first portion 16 and the second portion 18 together by adhesives, pressure or heat sensitive glues or the like, where applicable.

Although in the present embodiment, the first portion 16 and the second portion 18 are formed from a polyurethane gel and expanded polyurethane material respectively, those skilled in the art that other polymer or thermoplastic materials may also be utilised, such as poly vinyl acetate materials or other such suitable polymeric materials.

Alternatively, in other embodiments and as would be understood by those skilled in the art, other materials such as rubbers, elastomers, organic materials or combinations thereof, and co-polymer and mixed polymer blends and combinations thereof may also be utilised. Further, materials may be provided in the form of compact polymers, expanded polymeric materials or gel materials or combinations thereof and may be used in various combinations without departing from the scope of the invention. Furthermore, the sole 10 may be provided as a single material having varying densities so as to provide a first portion with appropriate cushioning whilst being of a expanded form for example for other parts of the sole so as to provide for structural integrity.

Furthermore, in other or alternate embodiments of the invention, the first portion 16 may be provided so as to provide medial or lateral support to the heel.

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of a user so as to more evenly distribute load to the heel and to prevent exacerbated medial or lateral wear of the rear portion of the sole 10. In other embodiments, the first portion may be provided as two or more discrete parts spaced laterally apart form each other and suitably located and sized so as to provide for more even loading and increased stabilisation to the underside of the foot of a user.

In the present embodiment, the first portion 16 is provided so as to extend partway through the sole 10 towards the lower surface 14. However, in other embodiments, the first portion 16 may extend to a greater or lesser extent through the thickness of the sole 10. Further, the first portion 16 is provided so as to extend the full width of the sole 10 in the present embodiment, however again, the first portion 16 may extend partway across the sole 10 in other embodiments.

In the present embodiment, the article 100 is depicted as a substantially planar "flip-flop" type footwear article, however, in other or alternate embodiments the article 100 may be provided with a raised heel, such as for women's type footwear. Further, as will be appreciated, the first portion 16 may be provided as a plurality of layers either in the direction between the upper and lower surface or laterally, and each layer may be provided with differing colours.

In other embodiments, cushioning elements such as "air cushioning" elements may be incorporated within the sole to provide for additional cushioning to the foot of a user.

Referring to Figure 3a, there is shown an embodiment 200a of the invention whereby a third portion 215a is provided towards the metacarpal portion.

of a user's foot to provide for cushioning to the front portion of the foot of a user The third portion may be formed from same of different materials as that of the first portion 216a.

In another embodiment of the footwear article 200b as shown in Figure 3b, the first portion 216b and the second portion 216 are integrally formed, and cooperatively provide for lateral support of the underside of the foot of a user.

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Referring to Figure 3c, and embodiment of the footwear article 200c is shown whereby a portion 219c of the first portion provides for medial arch support.

In a further embodiment of a footwear article 200d according to the present invention as depicted in Figure 3c, the first portion 216d is provided as two separate parts being spaced apart laterally so as to provide for increased medial or lateral support and cushioning to the underside of the heel portion of the foot of a user.

Figure 3e depicts yet another embodiment of a footwear article 200e according to the present invention whereby the article 200e is provided with a raised heel The first portion 216e provides for cushioning of the heel of a user whilst a third portion 215e is provided for contact with the ball of the foot of a user, which provides resistance and reduces the incidence or likelihood of the foot of the user sliding down the inclined surface.

Referring to Figures 4a, 4b and 4c, there are shown embodiments of footwear articles 300a, 300b and 300c having various foot engagement means Figure 4a shows a foot engagement means 320 typical of that of a "flip-flop".

Figure 4b shows an "cross-over" type engagement means and Figure 4c shows a single-strap type foot engagement means 320c. Those skilled in the art will appreciate that numerous types of foot engagement means are applicable without departing from the scope of the invention.

Referring to Figure 5a, there is shown another embodiment of a footwear article 400 according to the present invention In the present embodiment, the first portion 410 extends along the entire length of the article 400 so as to provide the entire upper surface 420 In this embodiment, the first portion 410 again is formed from a gel material so as to provide dampening to the foot of a user upon impact, in combination with an expanded polymeric foam of which the second portion 420 is formed.

Further, in the present embodiment, elongate grooves 440 extend laterally across the upper surface 420 of the article 400 The grooves 440 allow for localized deformation of the first portion 410, which provides for additional dampening to the

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foot of a user during use. Furthermore, the laterally extending grooves 440 also provide a "grip" effect which prevents slippage of the foot of a user against the other surface 420 during use.

Referring to Figure 5b, there is shown a further embodiment of a footwear article 500 according to the present invention. Similarly as in the embodiment depicted in Figure 5a, the first portion 510 extends the entire length of the footwear article 500 so as to form the entire upper surface 520. Again, the second portion is provided by an expanded polymeric material 520 of foam form which extends the entire length of the article 500.

In the present embodiment, grooves 540 are provided which, similarly as in the embodiment depicted in Figure 5a, allow for localized deformation of the first portion 510, and due to the gel like properties, and further incorporation with the expanded polymeric properties of the second portion 530, the grooves 540 allow for additional dampening and cushioning to the foot of a user during use. Furthermore, again the grooves 540 provide a "grip" type effect which reduces slippage of the foot of a user on the upper surface 520 of the article 500 during use.

Referring now to Figure 6, there is depicted yet a further embodiment of a footwear article 600 according to the present invention. In the present embodiment, the first portion 610, again formed from a gel material, and in this embodiment is provided towards the front portion of the footwear article 600. The first portion 610 forms a part of the upper surface 620, and the second portion 630, again formed from an expanded polymeric material, forms the remaining portion of the upper surface 520.

In the present embodiment, the first portion 610 provides for dampening and shock absorption at the front portion of the foot of a user in use, and furthermore, the first portion being located in this position provides for grip of the foot of a user and prevents slippage along the upper surface 620 in use.

Referring now to Figures 7a, 7b and 7c, there is depicted yet a further embodiment of a footwear article 700 according to the present invention. In the present embodiment, the first portion 710 is provided again in a gel material form,

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and the second portion 730 is provided in an expanded polymeric form. The first portion 710 extends the entire length of the footwear article 700 so as to form the entire upper surface 720 of the article 700. In the present embodiment and those as depicted in preceding embodiments, the first portion and the second portion are selected from suitable polymeric materials and are suitably sized so as to provide for repetitive flexion of the footwear article as shown in Figure 7b during use, and so as to provide for resilience or "spring bag" such that the deformation is elastic and the article returns to its rest states as depicted in Figure 7c. As will be understood and appreciated by those skilled in the art, a footwear article of the type depicted, is exposed to much flexion and bending and thus the first portion and second portion must be able to be maintained together to maintain the structural integrity of the sole.

In reference to the embodiments of the invention as depicted in Figures 5a to 7c and as described in the description above, as will be appreciated by those skilled in the art, the footwear articles are provided such that the sole of the article comprises the entire sole of the device, and the foot engagement means merely hold the sole to the bottom of the foot of the user. Such footwear articles are termed different names in different parts of the world, including terms such as "flip flop", "thongs" and "jandals".

As will be understood by those skilled in the art, to provide a flip-flop type footwear article, the article must be extremely flexible so as to allow for continual flexing during walking or ambulation of a person. Such a sole is distinctly different from that of traditional footwear articles, whereby a comparatively small amount of flexion is allowable and typically at one portion of the sole, in comparison with that as required and provided by flip-flop type footwear articles.

As will also be appreciated by those skilled in the art, it is necessary to provide an article which, after many repetitions of flexion, maintains its structural integrity without the first portion and the second portion separating or delaminating Furthermore, those skilled in the art will appreciate that the sole of a flip-flop device as claimed and shown in the accompanying drawings in accordance with the present invention, only comprises the upper portion and the lower portion as described, the upper portion (i e first portion) providing for direct contact with the

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underside of the foot of a user most often without a sock, and the lower portion (i e second portion) engages directly with the grounds or surface upon which a person walks, without the use of additional outer source or the like.

Furthermore, flip-flop type footwear, as will readily be understood and appreciated by those skilled in the art, are often exposed to harsh environmental conditions such as water and long durations of sunlight due to their typical applications, and the materials from which they are formed and the manner in which the portions are joined, must be capable of withstanding such exposure.

As such, those skilled in the art will appreciate that a substantial difference exists between the sole of the footwear article in the present invention and those of conventional footwear, for which have in the prior art been described as being formed by multiple layers.

It will be appreciated, that as the sole of the present invention is comprised only of the first portion and the second portion, these portions must be securely joined or bonded together securely in a manner, as there exists no outer shoe body whereby an inner sole is still retained within a shoe even if not securely bonded to the inside of a shoe, and also in view of typical applications as discussed above.

The present invention has overcome problems of the prior art such as delamination, so as to provide a footwear article having a sole distinctly different from those of conventional footwear, a sole which must endure significantly larger amounts of flexion and strain, whilst maintaining the structural integrity of the sole. By provision of a "co-molding process" whereby a gel material is co-moulded with a polymeric material ,which is expanded in a manner so as to provide continuity between the gel-type material and the expanded polymeric material. As such, a unitary sole of a unitary construct has been provided that overcomes practical and longevity problems which may be encountered when utilizing bonding techniques such as used in the prior art. The co-molding process provides for structural integrity and also maintains the bond between the materials throughout angles of flexion of the sole well beyond the amount of flexion that conventional footwear are exposed to. Furthermore, the co-molding process simplifies production so as to allow ease of manufacture and reduction in manual labour, and does not

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require separate formation of the two portions, and does not require a post-fabrication process for joining the portions.

Thus, the two portions, by being moulded, provides a unitary structure whereby the sole is formed of a "continuous" polymeric material, without the necessity for adhesive and the like, and thus mitigating the incidence of debonding, even throughout repetitive large amounts of flexing. The co-molding process provides for rapid and cost and time effective manufacture, and reduces the amount of material wastage, thus also providing environmental advantages.

While the present invention has been explained by reference to the examples or preferred embodiments described above, it will be appreciated that those are examples to assist understanding of the present invention and are not meant to be restrictive. Variations or modifications which are obvious or trivial to persons skilled in the art, as well as improvements made thereon, should be considered as equivalents of this invention.

Furthermore, while the present invention has been explained by reference to "flip-flop" type footwear articles, it should be appreciated that the invention can apply, whether with or without modification, to other footwear articles without loss of generality.

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CLAIMS

1. A footwear article comprising:

a generally elongate sole for engagement with and support of the foot of a person, said sole having an upper surface, a lower surface, a first portion being for interaction with at least the heel region of the foot of the person and a second portion for interaction with at least the metatarsal region of the foot of the person; and a foot engagement means for securing the footwear article to the foot of a person, characterised in that a first portion of the sole includes a first material having a first material property and the a second portion of the sole includes a second material having a second material property.

said first portion and said second portion extend at least to the upper surface of the sole and first material property provides for dampening of load imparted to the foot of the person upon contact with a surface.

2. A footwear article according to claim 1, wherein the first portion further provides for interaction with and at least partial support of the plantar arch of the user, wherein the first portion extends substantially laterally across the sole.

3. A footwear article according to any one of the preceding claims, wherein the first material is a polyurethane gel and the second material is an expanded poly vinyl acetate material.

4. A footwear article according to any one of the preceding claims, wherein the sole is formed as a unitary construct by co-molding the first portion and the second portion together.

5. A footwear article according to any one of the preceding claims, wherein the article is provided in the form of a "flip-flop" type footwear article.

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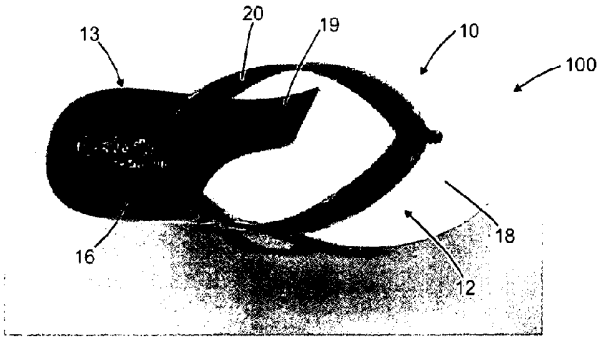

Figure 1a

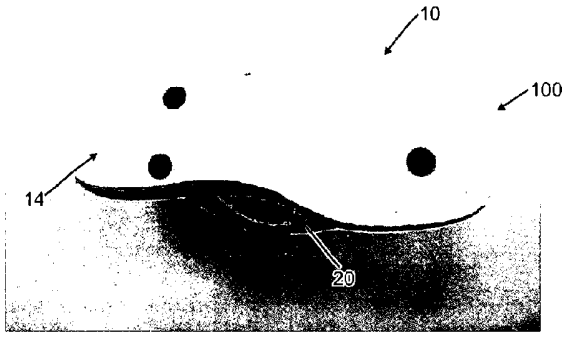

Figure 1b

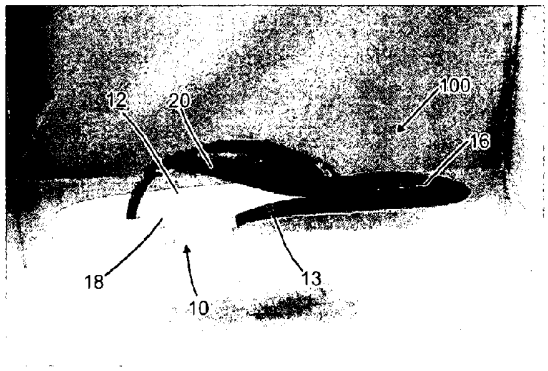

Figure 1c

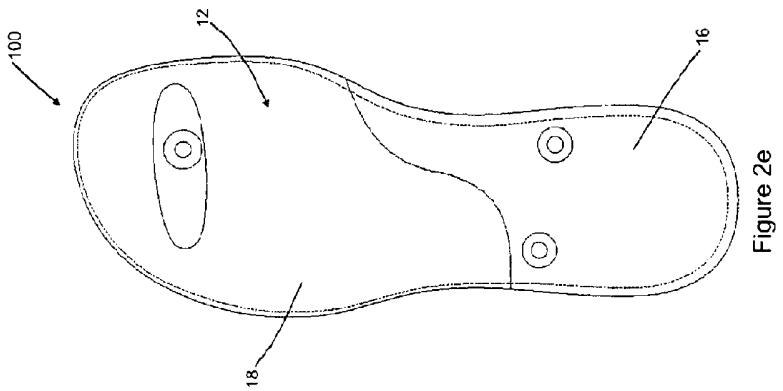

Figure 2e

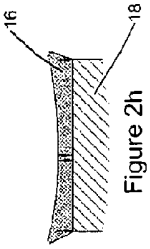

Figure 2h

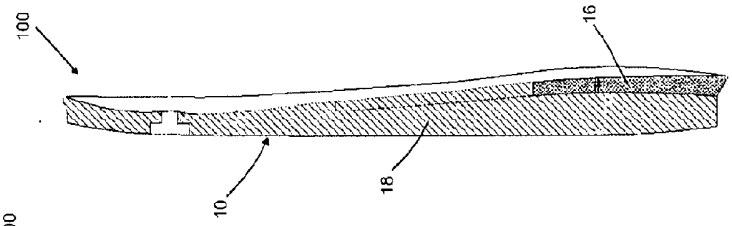

Figure 2d

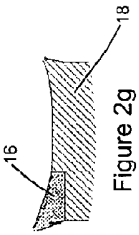

Figure 2g

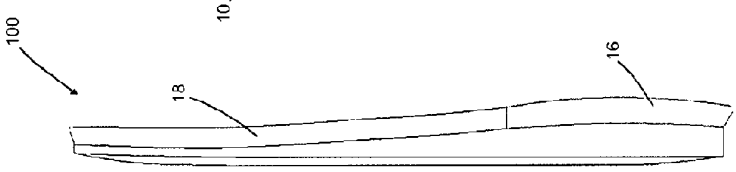

Figure 2c

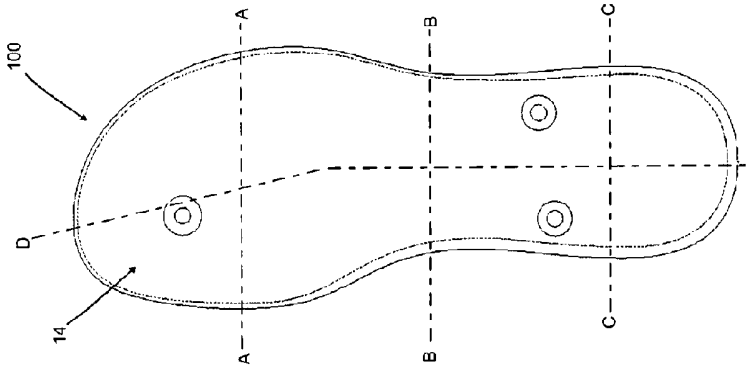

Figure 2b

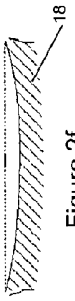

Figure 2f

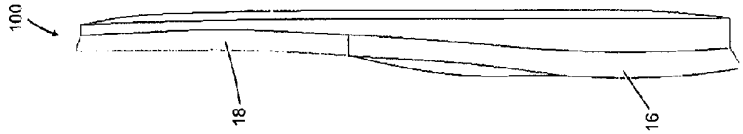

Figure 2a

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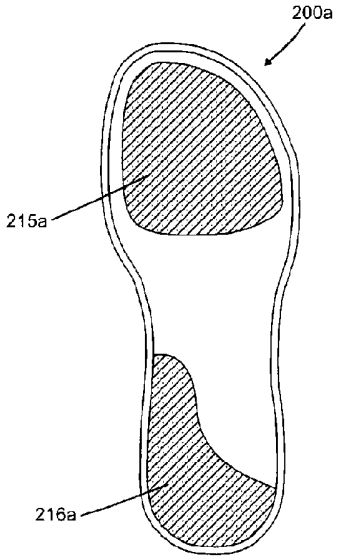

Figure 3a

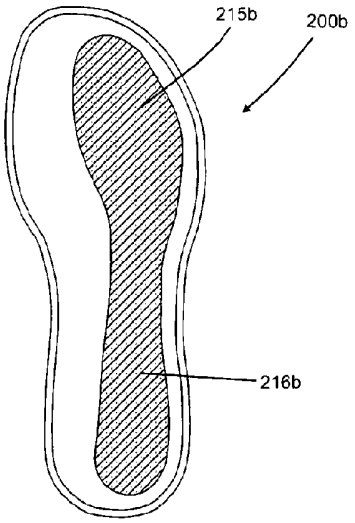

Figure 3b

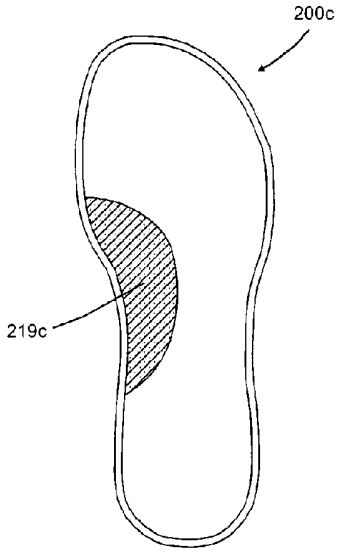

Figure 3c

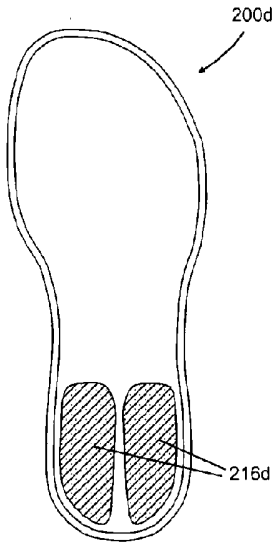

Figure 3d

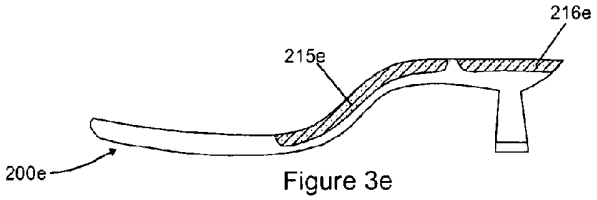

Figure 3e

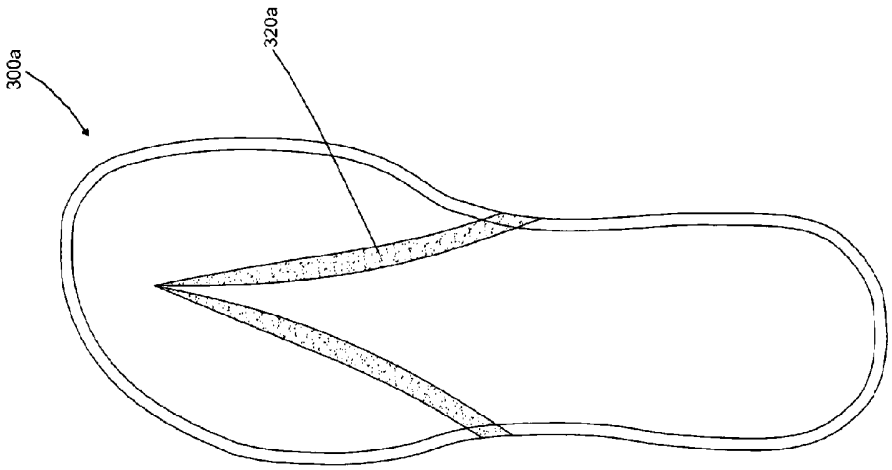

Figure 4a

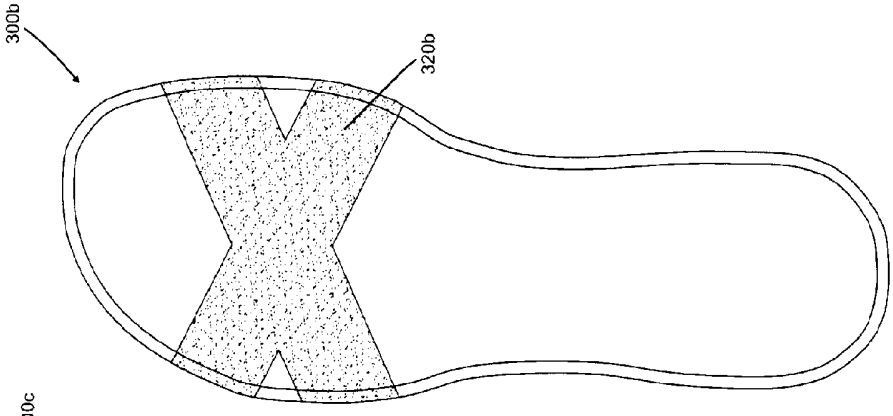

Figure 4b

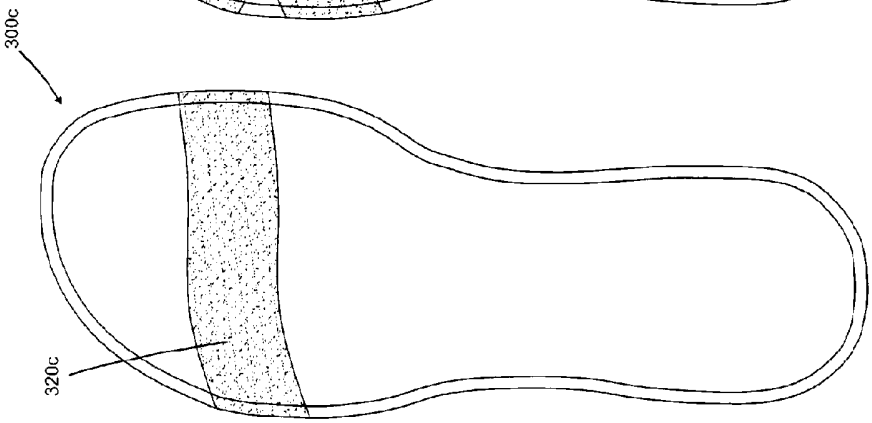

Figure 4c

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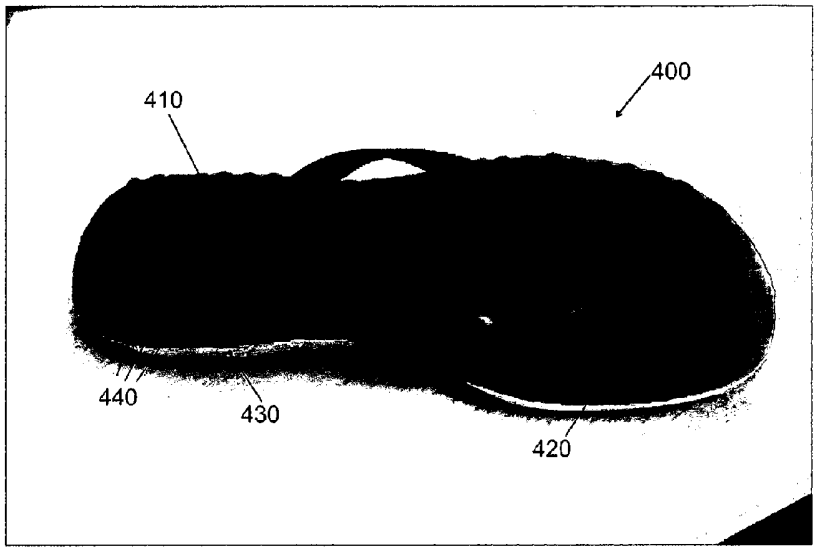

Figure 5a

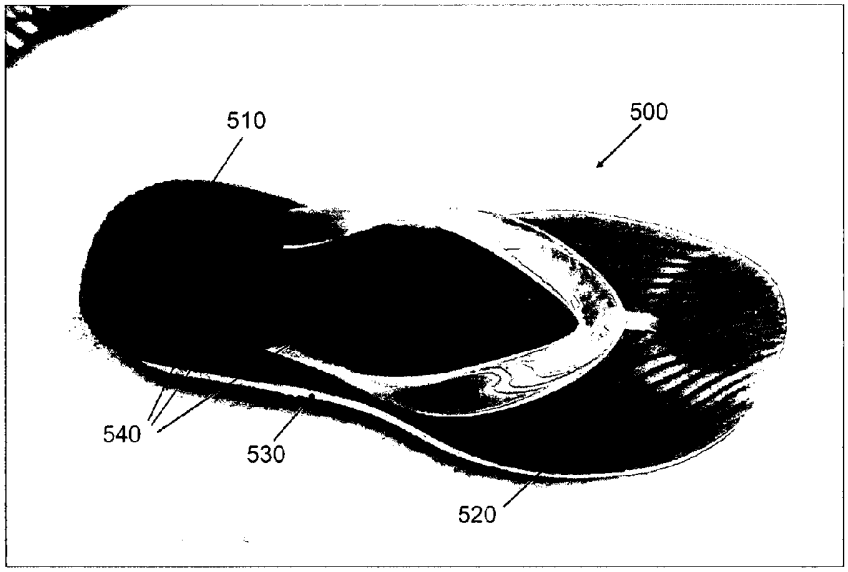

Figure 5b

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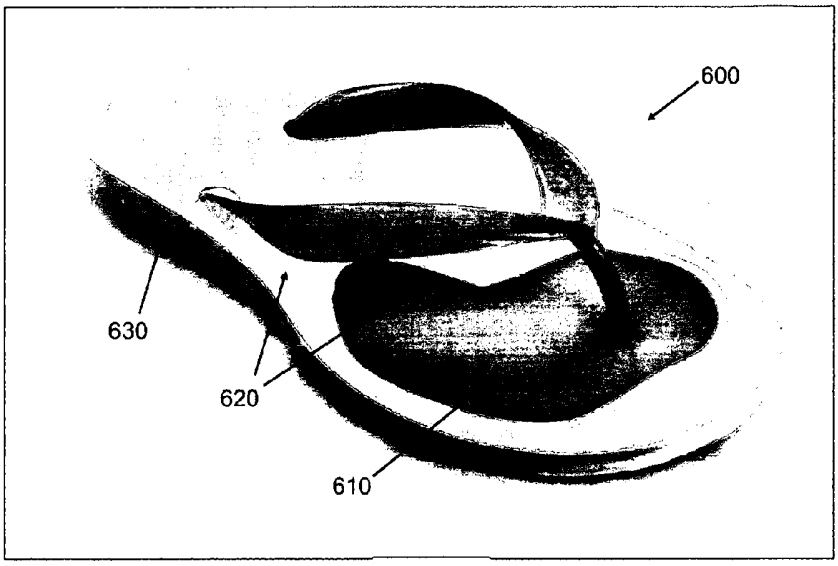

Figure 6

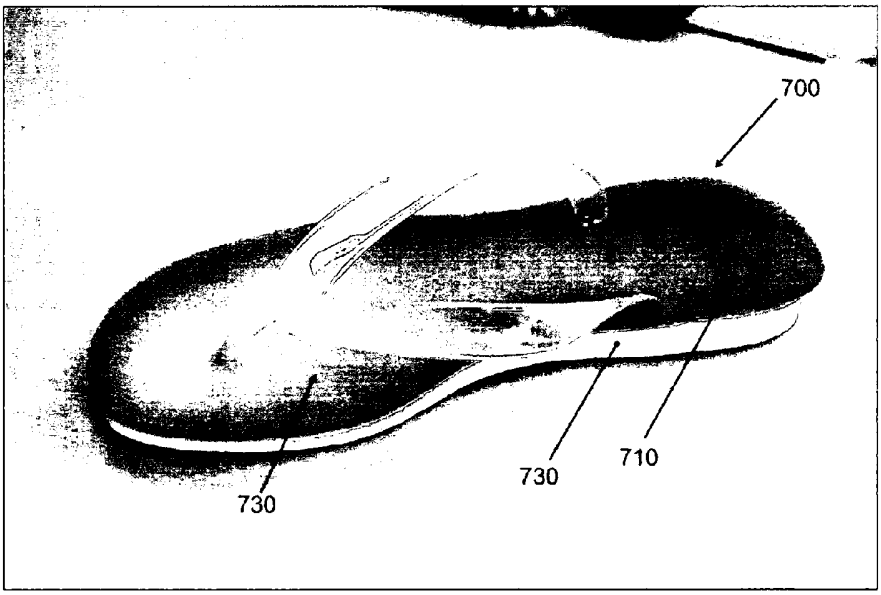

Figure 7a

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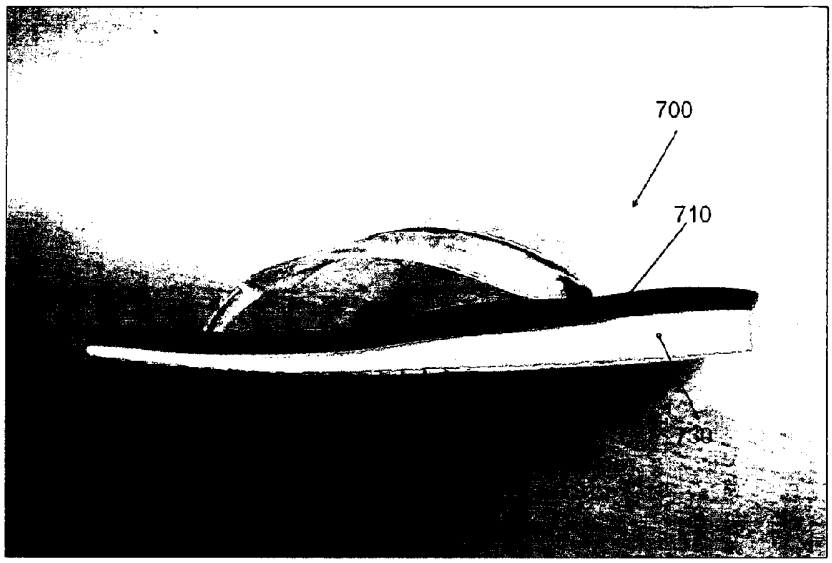

Figure 7b

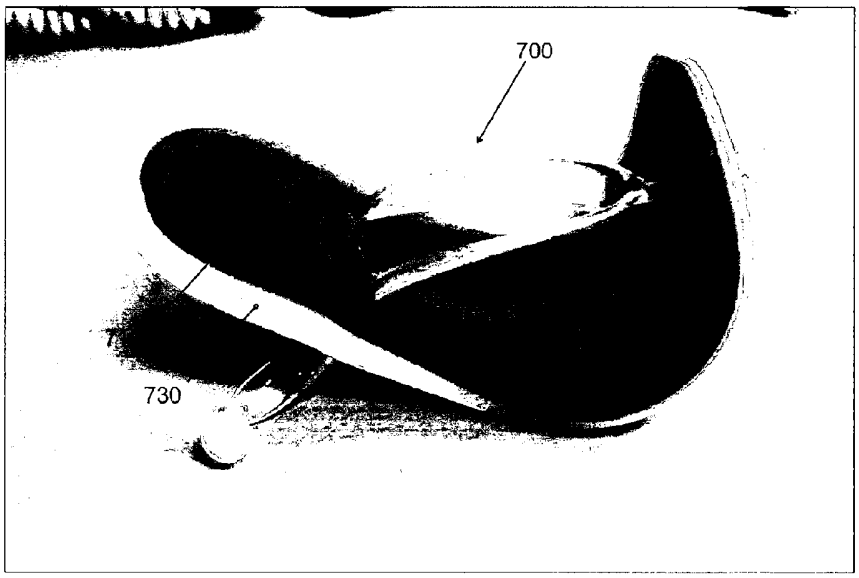

Figure 7c